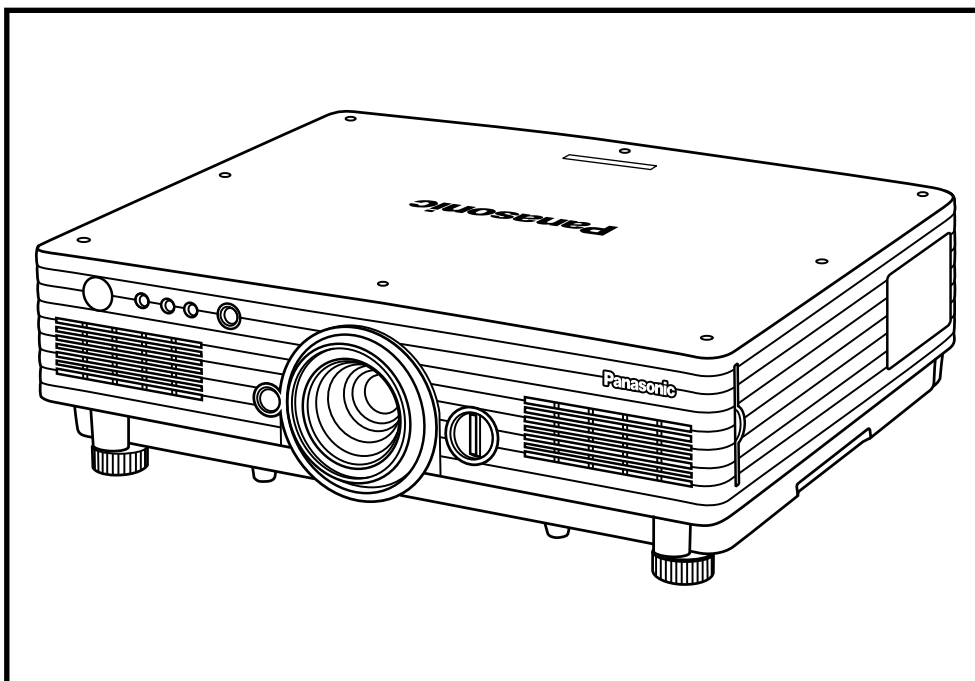


S P E C F I L E



The PT-DW5100L is not equipped with a lens.

Product Number : PT-**DW5100/DW5100L**

Product Name : DLP™ Projectors

Specifications

Main Unit

Power supply:	North America:	120 V AC, 50/60 Hz
	Europe:	220–240 V AC, 50/60 Hz
Power consumption:	North America:	770 W (770 VA) (10 W during standby mode with fan stopped)
	Europe:	750 W (790 VA) (15 W during standby mode with fan stopped)
DLP™ chip:	Panel size:	0.65" diagonal (15:9 aspect ratio)
	Display method:	DLP™ chip x 1, DLP™ system
	Pixels:	983,040 (1,280 x 768) x 1, total of 983,040 pixels
Lens:	PT-DW5100:	Powered zoom/focus lenses (1.8–2.4:1), F 1.7–2.0, f 25.6–33.8 mm
	PT-DW5100L:	Optional poweredzoom/focus lenses
Lamp:		300 W UHM lamps (x 2) (dual lamp system)
Screen size:		50–600 inches (50–200 inches with the ET-DLE050 and ET-DLE055), 15:9 aspect ratio
Brightness*1:		5,500 lumens (dual lamp, high power mode)
Center-to-corner uniformity*1:		90%
Contrast*1:		2,000:1 (full on/full off, contrast mode: high, brightness: 2,750 lumens) 1,000:1 (full on/full off, contrast mode: normal)
Resolution:		1,280 x 768 pixels (1,600 x 1,200 pixels compatible, compression mode)
Scanning frequency:	RGB:	Horizontal: 15–91 kHz, Vertical: 50–85 Hz, Dot clock: 150 MHz or lower
	YPbPr (YCbCr):	480i: fh 15.75 kHz; fv 59.94 Hz, 576i: fh 15.63 kHz; fv 50 Hz, 480p: fh 31.50 kHz; fv 59.94 Hz, 576p: fh 31.25 kHz; fv 50 Hz, 720/60p: fh 45 kHz; fv 60 Hz, 720/50p: fh 37.5 kHz; fv 50 Hz, 1035/60i: fh 33.75 kHz; fv 60 Hz, 1080/60i: fh 33.75 kHz; fv 60 Hz, 1080/50i: fh 28.13 kHz; fv 50 Hz, 1080/60p: fh 67.5 kHz; fv 60 Hz, 1080/50p: fh 56.25 kHz; fv 50 Hz
	S-Video/Video:	Horizontal: 15.75/15.63 kHz, Vertical: 50/60 Hz, (NTSC, NTSC4.43, PAL, PAL60, PAL-N, PAL-M, SECAM)
Optical axis shift:		Horizontal (manual) and vertical (powered), Horizontal: ±10%, vertical: +60%
Keystone correction range:		Vertical: ±30°
Installation:		Ceiling/floor, front/rear
Terminals*2:	DVI-D IN:	DVI-D 24-pin x 1, DVI 1.0 compliant, HDCP compatible, for single link only
	RGB 1 IN:	BNC x 5
	R, G, B:	G: 0.7 Vp-p (G: 1.0 Vp-p for sync on G), 75 ohms, B, R: 0.7 Vp-p, 75 ohms HD/VD, SYNC: TTL (positive/negative)
	Y, Pb, Pr:	Y: 1.0 p-p, 75 ohms (including sync signal), Pb/Pr: 0.7 Vp-p, 75 ohms
	RGB 2 IN:	D-sub HD 15-pin x 1
	R, G, B:	G: 0.7 Vp-p (G: 1.0 Vp-p for sync on G), 75 ohms, B, R: 0.7 Vp-p, 75 ohms HD/VD, SYNC: TTL (positive/negative)
	Y, Pb, Pr:	Y: 1.0 p-p, 75 ohms (including sync signal), Pb/Pr: 0.7 Vp-p, 75 ohms
	VIDEO IN:	BNC x 1, 1.0 Vp-p, 75 ohms
	S-VIDEO IN:	Mini DIN 4-pin x 1, Y: 1.0 Vp-p, C: 0.286 Vp-p, 75 ohms
	SERIAL IN:	D-sub 9-pin x 1 (RS-232C compliant) for external controller
	SERIAL OUT:	D-sub 9-pin x 1 (RS-232C compliant) for external controller
	REMOTE 1 IN:	M3 jack x 1 for wired remote control or link control
	REMOTE 1 OUT:	M3 jack x 1 for link control
	REMOTE 2 IN:	D-sub 9-pin x 1 for external control (parallel)
	LAN:	RJ-45 x 1, compliant with PLink™, 10Base-T/100Base-TX
Power cord length:		3.0 m (9'10")
Cabinet materials:		Molded plastic

On-screen menu:	9 languages: English, French, German, Spanish, Italian, Russian, Korean, Chinese, and Japanese
Dimensions (W x H x D):	PT-DW5100 530 x 167 x 441 mm (20-7/8" x 6-9/16" x 17-3/8") (with supplied lens)
	PT-DW5100L 530 x 167 x 429 mm (20-7/8" x 6-9/16" x 16-7/8") (without lens)
Weight:	PT-DW5100 13.9 kg (30.6 lbs) (with supplied lens)
	PT-DW5100L 13.1 kg (28.9 lbs) (without lens)
Operating temperature:	0°–45°C (32°–113°F)
Operating humidity:	20%–80% (no condensation)

Remote Control Unit

Power supply:	3 V DC (AA battery x 2)
Operation range*3:	Wireless: Approx. 30 m (98.4 feet) when operated from directly in front of the signal receptor
Dimensions (W x H x D):	51 x 176 x 22.5 mm (2" x 6-15/16" x 7/8")
Weight:	134 g (4.7 oz) (including batteries)

Supplied Accessories

Power cord, Wireless/wired remote control unit, Batteries for remote control (x 2), Wire rope

Optional Accessories

Replacement lamp unit:	ET-LAD57 (1 unit)
	ET-LAD57W (set of two lamps)
Ceiling mount bracket:	ET-PKD56H (for high ceilings)
	ET-PKD55S (for low ceilings)
Zoom lens (1.4–1.8:1)	ET-DLE100
Zoom lens (2.5–4.1:1)	ET-DLE200
Zoom lens (3.5–4.7:1)	ET-DLE310
Zoom lens (4.7–8.9:1)	ET-DLE410
Fixed-focus lens (0.8:1)	ET-DLE050
Zoom lens (1.4–2.0:1)	ET-DLE150
Zoom lens (2.4–3.8:1)	ET-DLE250
Zoom lens (3.8–5.7:1)	ET-DLE350
Zoom lens (5.6–9.0:1)	ET-DLE450
Fixed-focus lens (0.8:1)	ET-DLE055

Weights and dimensions shown are approximate. Specifications subject to change without notice.

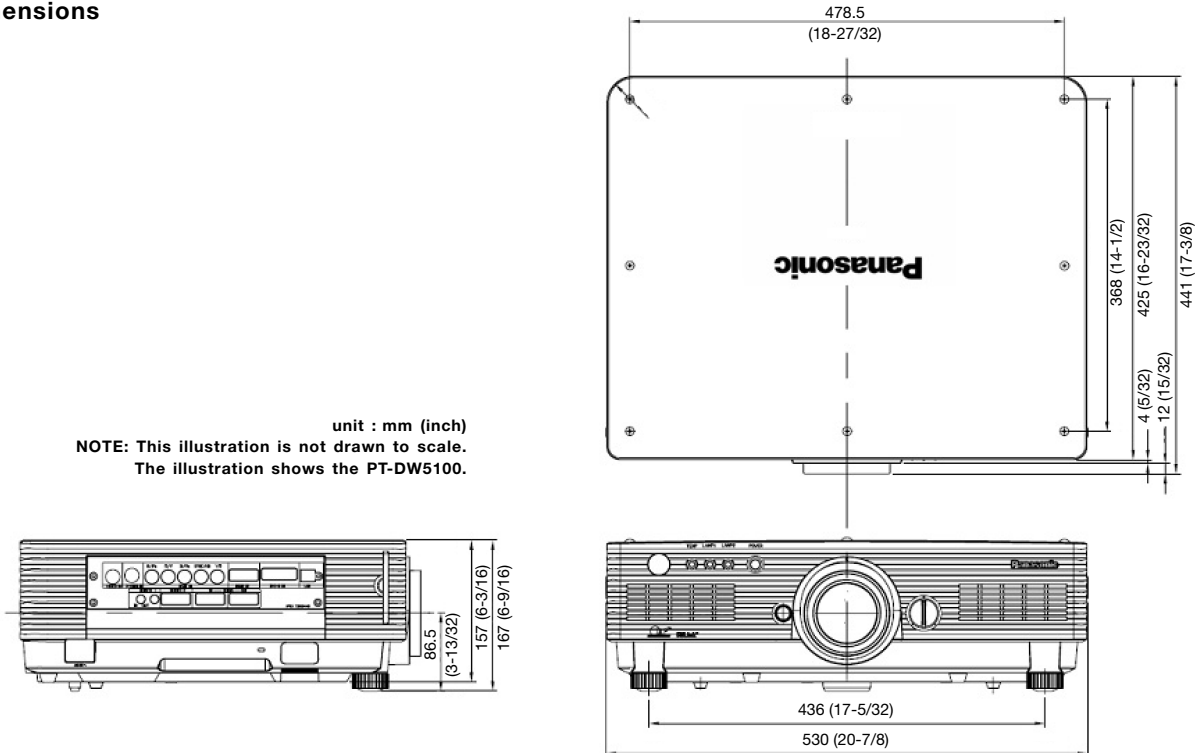
*1 Measurement, measuring conditions, and method of notation all comply with ISO 21118 international standards.

*2 The HD/SYNC and VD inputs do not accept the tri-level sync signal.

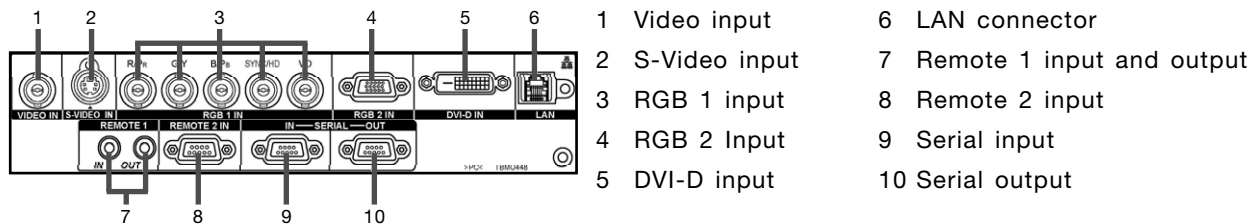
*3 Operation range differs depending on environments.

Dimensions

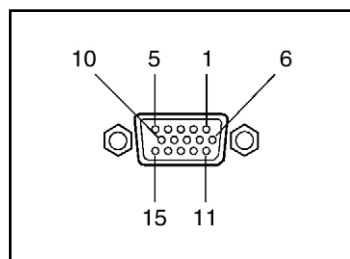
unit : mm (inch)
NOTE: This illustration is not drawn to scale.
The illustration shows the PT-DW5100.



Terminals

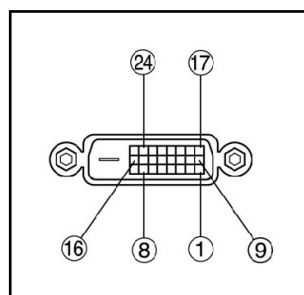


RGB IN connector pin assignment



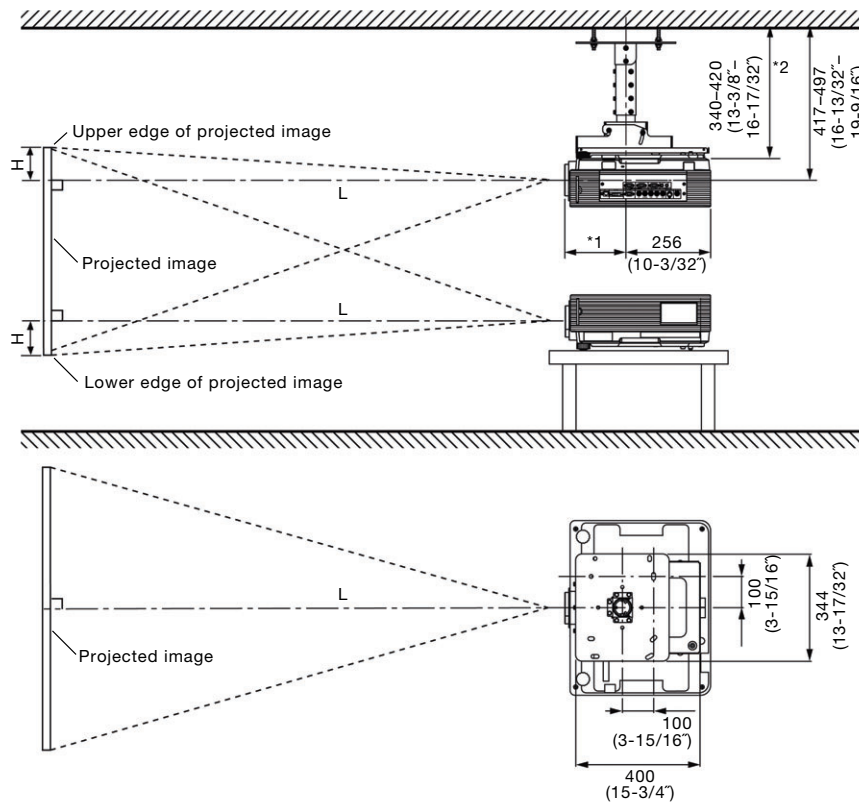
no.	signal	no.	signal	no.	signal
1	R/P _R	6	GND	11	GND
2	G/Y	7	GND	12	NC
3	B/P _B	8	GND	13	HD/SYNC
4	GND	9	NC	14	VD
5	GND	10	GND	15	NC

DVI-D output connector pin assignment



no.	signal	no.	signal	no.	signal
1	T, M, D, S data 2-	9	T, M, D, S data 1-	17	T, M, D, S data 0-
2	T, M, D, S data 2+	10	T, M, D, S data 1+	18	T, M, D, S data 0+
3	T, M, D, S data 2 shield	11	T, M, D, S data 1 shield	19	T, M, D, S data 0 shield
4	NC	12	NC	20	NC
5	NC	13	NC	21	NC
6	DDC clock	14	+5 V	22	T, M, D, S clock shield
7	DDC clock	15	GND	23	T, M, D, S clock +
8	NC	16	Hot plug detection	24	T, M, D, S clock -

Standard setting-up position (when installed using the ET-PKD56H)



*1 When the lens protrudes to the maximum.

185 mm (7-9/32") with the supplied lens
 209 mm (8-7/32") with the ET-DLE100
 208 mm (8-3/16") with the ET-DLE200
 220 mm (8-21/32") with the ET-DLE310
 209 mm (8-7/32") with the ET-DLE410
 177 mm (6-31/32") with the ET-DLE050
 212 mm (8-11/32") with the ET-DLE150
 213 mm (8-3/8") with the ET-DLE250
 219 mm (8-5/8") with the ET-DLE350
 263 mm (10-11/32") with the ET-DLE450
 195 mm (7-11/16") with the ET-DLE055

*2 Adjustable in 40 mm (1-9/16") steps.

CAUTION

The ET-DLE050 and ET-DLE055 have a fixed short-focus lens. Therefore, the lens shift function provided in the main unit cannot be used.

If the lens shift function is used, the corners of images may not be displayed or images may remain out of focus in some cases.

Projection distance for 15:9 aspect ratio screen: ET-DLE100/DLE200/DLE310/DLE410/DLE050

Unit: millimeters

Screen size (inch, diagonal)	Distance to screen (L)									Height from the edge of screen to center of lens (H)		
	Zoom								Fixed-focus			
	ET-DLE100 Zoom lens		ET-DLE200 Zoom lens		ET-DLE310 Zoom lens		ET-DLE410 Zoom lens		ET-DLE050 Fixed-focus lens	Zoom lenses		Fixed- focus lens
	min.	max.	min.	max.	min.	max.	min.	max.				
50	1,455	1,972	2,669	4,399	3,824	5,024	5,083	9,620	864	-87 –	327	327
60	1,755	2,376	3,216	5,294	4,610	6,050	6,127	11,571	1,044	-105 –	392	392
70	2,055	2,780	3,763	6,189	5,396	7,076	7,171	13,522	1,224	-122 –	457	457
80	2,355	3,184	4,310	7,084	6,182	8,102	8,215	15,473	1,404	-139 –	523	523
90	2,655	3,588	4,857	7,979	6,968	9,128	9,259	17,424	1,584	-157 –	588	588
100	2,955	3,992	5,404	8,874	7,754	10,154	10,303	19,375	1,764	-174 –	653	653
120	3,555	4,800	6,498	10,664	9,326	12,206	12,391	23,277	2,124	-209 –	784	784
150	4,455	6,012	8,139	13,349	11,684	15,284	15,523	29,130	2,664	-261 –	980	980
200	5,955	8,032	10,874	17,824	15,614	20,414	20,743	38,885	3,564	-348 –	1,307	1,307
250	7,455	10,052	13,609	22,299	19,544	25,544	25,963	48,640	–	-436 –	1,634	–
300	8,955	12,072	16,344	26,774	23,474	30,674	31,183	58,395	–	-523 –	1,960	–
400	11,955	16,112	21,814	35,724	31,334	40,934	41,623	77,905	–	-697 –	2,614	–
500	14,955	20,152	27,284	44,674	39,194	51,194	52,063	97,415	–	-871 –	3,267	–
600	17,955	24,192	32,754	53,624	47,054	61,454	62,503	116,925	–	-1045 –	3,920	–

Unit: feet

Screen size (inch, diagonal)	Distance to screen (L)									Height from the edge of screen to center of lens (H)		
	Zoom								Fixed-focus			
	ET-DLE100 Zoom lens		ET-DLE200 Zoom lens		ET-DLE310 Zoom lens		ET-DLE410 Zoom lens		ET-DLE050 Fixed-focus lens	Zoom lenses		Fixed- focus lens
	min.	max.	min.	max.	min.	max.	min.	max.				
50	4.8	6.5	8.8	14.4	12.6	16.5	16.7	31.6	2.8	-0.3 –	1.0	1.0
60	5.8	7.8	10.6	17.4	15.1	19.9	20.1	38.0	3.4	-0.4 –	1.2	1.2
70	6.8	9.1	12.4	20.3	17.7	23.2	23.5	44.4	4.0	-0.5 –	1.4	1.4
80	7.7	10.4	14.2	23.2	20.3	26.6	27.0	50.8	4.6	-0.5 –	1.7	1.7
90	8.7	11.8	15.9	26.2	22.9	30.0	30.4	57.2	5.2	-0.6 –	1.9	1.9
100	9.7	13.1	17.7	29.1	25.4	33.3	33.8	63.6	5.8	-0.6 –	2.1	2.1
120	11.7	15.7	21.3	35.0	30.6	40.0	40.7	76.4	7.0	-0.7 –	2.5	2.5
150	14.6	19.7	26.7	43.8	38.3	50.1	50.9	95.6	8.7	-0.9 –	3.2	3.2
200	19.5	26.4	35.7	58.5	51.2	67.0	68.1	127.6	11.7	-1.2 –	4.2	4.2
250	24.5	33.0	44.7	73.2	64.1	83.8	85.2	159.6	–	-1.5 –	5.3	–
300	29.4	39.6	53.6	87.8	77.0	100.6	102.3	191.6	–	-1.8 –	6.4	–
400	39.2	52.9	71.6	117.2	102.8	134.3	136.6	255.6	–	-2.3 –	8.5	–
500	49.1	66.1	89.5	146.6	128.6	168.0	170.8	319.6	–	-2.9 –	10.7	–
600	58.9	79.4	107.5	175.9	154.4	201.6	205.1	383.6	–	-3.5 –	12.8	–

- The value for L (distance to screen) varies slightly depending on the zoom lens characteristics.
- At the shortest projection distance, the zoom lens characteristics may cause slight image distortion.
- When vertical keystone correction is used, the image is corrected in the direction that reduces its projected size.
- The brightness varies depending on the zoom setting.

Projection distance for 15:9 aspect ratio screen:**Supplied lens and ET-DLE150/DLE250/DLE350/DLE450/DLE055**

Unit: millimeters														
Screen size (inch, diagonal)	Distance to screen (L)											Height from the edge of screen to center of lens (H)		
	Zoom										Fixed-focus			
	ET-DLE150 Zoom lens		Supplied lens		ET-DLE250 Zoom lens		ET-DLE350 Zoom lens		ET-DLE450 Zoom lens		ET-DLE055 Fixed-focus lens	Zoom lenses	Fixed- focus lens*	
	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.				
50	1,464	2,140	1,945	2,586	2,572	4,109	4,045	6,182	6,027	9,705	882	-87 –	327	327
60	1,768	2,579	2,347	3,116	3,102	4,947	4,881	7,445	7,292	11,706	1,068	-105 –	392	392
70	2,072	3,017	2,749	3,646	3,632	5,784	5,717	8,709	8,558	13,707	1,254	-122 –	457	457
80	2,375	3,455	3,151	4,176	4,163	6,622	6,553	9,972	9,824	15,708	1,439	-139 –	523	523
90	2,679	3,893	3,553	4,706	4,693	7,459	7,389	11,235	11,089	17,709	1,625	-157 –	588	588
100	2,982	4,331	3,955	5,236	5,224	8,297	8,225	12,498	12,355	19,710	1,811	-174 –	653	653
120	3,590	5,207	4,759	6,296	6,284	9,972	9,897	15,025	14,886	23,711	2,183	-209 –	784	784
150	4,501	6,521	5,965	7,886	7,875	12,485	12,405	18,815	18,683	29,714	2,741	-261 –	980	980
200	6,019	8,711	7,975	10,536	10,527	16,673	16,585	25,131	25,012	39,719	3,670	-348 –	1,307	1,307
250	7,537	10,901	9,985	13,186	13,179	20,861	20,766	31,448	31,340	49,723	–	-436 –	1,634	–
300	9,055	13,092	11,995	15,836	15,831	25,049	24,946	37,764	37,668	59,727	–	-523 –	1,960	–
400	12,092	17,472	16,010	21,138	21,134	33,426	33,306	50,397	50,325	79,736	–	-697 –	2,614	–
500	15,128	21,853	20,029	26,438	26,438	41,802	41,666	63,030	62,981	99,745	–	-871 –	3,267	–
600	18,165	26,233	24,048	31,739	31,741	50,178	50,027	75,663	75,638	119,754	–	-1,045 –	3,920	–

													Unit: feet		
Screen size (inch, diagonal)	Distance to screen (L)											Height from the edge of screen to center of lens (H)			
	Zoom										Fixed-focus				
	ET-DLE150 Zoom lens		Supplied lens		ET-DLE250 Zoom lens		ET-DLE350 Zoom lens		ET-DLE450 Zoom lens		ET-DLE055 Fixed-focus lens	Zoom lenses		Fixed- focus lens*	
	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.					
50	4.8	7.0	6.4	8.5	8.4	13.5	13.3	20.3	19.8	31.8	2.9	-0.3 – 1.1	1.1		
60	5.8	8.5	7.7	10.2	10.2	16.2	16.0	24.4	23.9	38.4	3.5	-0.4 – 1.3	1.3		
70	6.8	9.9	9.0	12.0	11.9	19.0	18.8	28.6	28.1	45.0	4.1	-0.5 – 1.5	1.5		
80	7.8	11.3	10.3	13.7	13.7	21.7	21.5	32.7	32.2	51.5	4.7	-0.5 – 1.8	1.8		
90	8.8	12.8	11.7	15.4	15.4	24.5	24.3	36.9	36.4	58.1	5.3	-0.6 – 2.0	2.0		
100	9.8	14.2	13.0	17.2	17.1	27.2	27.0	41.0	40.6	64.7	5.9	-0.6 – 2.2	2.2		
120	11.8	17.1	15.6	20.7	20.6	32.7	32.5	49.3	48.9	77.8	7.2	-0.7 – 2.6	2.6		
150	14.8	21.4	19.6	25.9	25.8	41.0	40.7	61.7	61.3	97.5	9.0	-0.9 – 3.3	3.3		
200	19.8	28.6	26.2	34.6	34.5	54.7	54.4	82.4	82.1	130.3	12.0	-1.2 – 4.3	4.3		
250	24.8	35.8	32.8	43.3	43.2	68.5	68.1	103.1	102.9	163.1	–	-1.5 – 5.4	–		
300	29.8	42.9	39.4	52.0	51.9	82.2	81.9	123.9	123.6	196.0	–	-1.8 – 6.5	–		
400	39.7	57.3	52.6	69.3	69.3	109.7	109.3	165.3	165.2	261.6	–	-2.3 – 8.6	–		
500	49.7	71.7	65.7	86.7	86.7	137.2	136.7	206.7	206.7	327.3	–	-2.9 – 10.8	–		
600	59.7	86.1	78.9	104.1	104.1	164.7	164.1	248.2	248.2	392.9	–	-3.5 – 12.9	–		

- The value for L (distance to screen) varies slightly depending on the zoom lens characteristics.
- At the shortest projection distance, the zoom lens characteristics may cause slight image distortion.
- When vertical keystone correction is used, the image is corrected in the direction that reduces its projected size.
- The brightness varies depending on the zoom setting.

Projection distance for 16:9 aspect ratio screen: ET-DLE100/DLE200/DLE310/DLE410/DLE050

Unit: millimeters

Screen size (inch, diagonal)	Distance to screen (L)									Height from the edge of screen to center of lens (H)	
	Zoom								Fixed-focus		
	ET-DLE100 Zoom lens		ET-DLE200 Zoom lens		ET-DLE310 Zoom lens		ET-DLE410 Zoom lens		ET-DLE050 Fixed-focus lens	Zoom lenses	Fixed- focus lens
	min.	max.	min.	max.	min.	max.	min.	max.			
50	1,480	2,007	2,714	4,474	3,889	5,109	5,168	9,780	879	-137 – 311	311
60	1,785	2,418	3,270	5,384	4,688	6,152	6,229	11,763	1,062	-164 – 374	374
70	2,090	2,829	3,826	6,294	5,487	7,195	7,290	13,746	1,245	-192 – 436	436
80	2,395	3,240	4,382	7,204	6,286	8,238	8,351	15,729	1,428	-219 – 498	498
90	2,700	3,651	4,938	8,114	7,085	9,281	9,412	17,712	1,611	-247 – 560	560
100	3,005	4,062	5,494	9,024	7,884	10,324	10,473	19,695	1,794	-274 – 623	623
120	3,615	4,884	6,606	10,844	9,482	12,410	12,595	23,661	2,160	-329 – 747	747
150	4,530	6,117	8,274	13,574	11,879	15,539	15,778	29,610	2,709	-411 – 934	934
200	6,055	8,172	11,054	18,124	15,874	20,754	21,083	39,525	3,624	-548 – 1,245	1,245
250	7,580	10,227	13,834	22,674	19,869	25,969	26,388	49,440	–	-685 – 1,557	–
300	9,105	12,282	16,614	27,224	23,864	31,184	31,693	59,355	–	-822 – 1,868	–
400	12,155	16,392	22,174	36,324	31,854	41,614	42,303	79,185	–	-1,096 – 2,491	–
500	15,205	20,502	27,734	45,424	39,844	52,044	52,913	99,015	–	-1,370 – 3,113	–
600	18,255	24,612	33,294	54,524	47,834	62,474	63,523	118,845	–	-1,644 – 3,736	–

Unit: feet

Screen size (inch, diagonal)	Distance to screen (L)									Height from the edge of screen to center of lens (H)	
	Zoom								Fixed-focus		
	ET-DLE100 Zoom lens		ET-DLE200 Zoom lens		ET-DLE310 Zoom lens		ET-DLE410 Zoom lens		ET-DLE050 Fixed-focus lens	Zoom lenses	Fixed- focus lens
	min.	max.	min.	max.	min.	max.	min.	max.			
50	4.9	6.6	8.9	14.7	12.8	16.8	17.0	32.1	3.0	-0.5 – 1.1	1.1
60	5.9	7.9	10.7	17.7	15.4	20.2	20.4	38.6	3.6	-0.6 – 1.3	1.3
70	6.9	9.3	12.6	20.7	18.0	23.6	23.9	45.1	4.2	-0.7 – 1.5	1.5
80	7.9	10.6	14.4	23.6	20.6	27.0	27.4	51.6	4.8	-0.8 – 1.7	1.7
90	8.9	12.0	16.2	26.6	23.2	30.5	30.9	58.1	5.5	-0.9 – 1.9	1.9
100	9.9	13.3	18.0	29.6	25.9	33.9	34.4	64.6	6.1	-0.9 – 2.1	2.1
120	11.9	16.0	21.7	35.6	31.1	40.7	41.3	77.6	7.3	-1.1 – 2.5	2.5
150	14.9	20.1	27.2	44.5	39.0	51.0	51.8	97.2	9.2	-1.4 – 3.1	3.1
200	19.9	26.8	36.3	59.5	52.1	68.1	69.2	129.7	12.3	-1.8 – 4.1	4.1
250	24.9	33.6	45.4	74.4	65.2	85.2	86.6	162.2	–	-2.3 – 5.2	–
300	29.9	40.3	54.5	89.3	78.3	102.3	104.0	194.7	–	-2.7 – 6.2	–
400	39.9	53.8	72.8	119.2	104.5	136.5	138.8	259.8	–	-3.6 – 8.2	–
500	49.9	67.3	91.0	149.0	130.7	170.8	173.6	324.9	–	-4.5 – 10.3	–
600	59.9	80.8	109.2	178.9	156.9	205.0	208.4	389.9	–	-5.4 – 12.3	–

- The value for L (distance to screen) varies slightly depending on the zoom lens characteristics.
- At the shortest projection distance, the zoom lens characteristics may cause slight image distortion.
- When vertical keystone correction is used, the image is corrected in the direction that reduces its projected size.
- The brightness varies depending on the zoom setting.

Projection distance for 16:9 aspect ratio screen:**Supplied lens and ET-DLE150/DLE250/DLE350/DLE450/DLE055**

Unit: millimeters													
Screen size (inch, diagonal)	Distance to screen (L)											Height from the edge of screen to center of lens (H)	
	Zoom										Fixed-focus		
	ET-DLE150 Zoom lens		Supplied lens		ET-DLE250 Zoom lens		ET-DLE350 Zoom lens		ET-DLE450 Zoom lens		ET-DLE055 Fixed-focus lens	Zoom lenses	Fixed- focus lens*
	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.			
50	1,489	2,176	1,977	2,630	2,615	4,178	4,114	6,286	6,131	9,870	897	-137 – 311	311
60	1,798	2,622	2,386	3,169	3,154	5,029	4,963	7,570	7,417	11,903	1,086	-164 – 374	374
70	2,106	3,067	2,794	3,707	3,693	5,880	5,813	8,854	8,703	13,937	1,275	-192 – 436	436
80	2,415	3,512	3,203	4,246	4,233	6,732	6,663	10,138	9,990	15,971	1,464	-219 – 498	498
90	2,724	3,957	3,611	4,785	4,772	7,583	7,513	11,422	11,276	18,005	1,653	-247 – 560	560
100	3,032	4,403	4,020	5,324	5,311	8,435	8,362	12,706	12,563	20,038	1,842	-274 – 623	623
120	3,650	5,293	4,837	6,401	6,389	10,137	10,062	15,274	15,136	24,106	2,220	-329 – 747	747
150	4,576	6,629	6,062	8,017	8,006	12,692	12,611	19,126	18,995	30,207	2,786	-411 – 934	934
200	6,119	8,855	8,105	10,711	10,701	16,948	16,860	25,546	25,427	40,376	3,731	-548 – 1,245	1,245
250	7,662	11,081	10,147	13,405	13,397	21,205	21,109	31,967	31,859	50,544	–	-685 – 1,557	–
300	9,205	13,307	12,189	16,099	16,092	25,462	25,358	38,387	38,292	60,713	–	-822 – 1,868	–
400	12,292	17,760	16,274	21,486	21,482	33,976	33,855	51,227	51,156	81,051	–	-1,096 – 2,491	–
500	15,378	22,212	20,359	26,874	26,873	42,490	42,353	64,068	64,020	101,388	–	-1,370 – 3,113	–
600	18,464	26,665	24,444	32,261	32,264	51,004	50,850	76,908	76,885	121,725	–	-1,644 – 3,736	–

													Unit: feet		
Screen size (inch, diagonal)	Distance to screen (L)											Height from the edge of screen to center of lens (H)			
	Zoom										Fixed-focus				
	ET-DLE150 Zoom lens		Supplied lens		ET-DLE250 Zoom lens		ET-DLE350 Zoom lens		ET-DLE450 Zoom lens		ET-DLE055 Fixed-focus lens	Zoom lenses		Fixed- focus lens*	
	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.					
50	4.9	7.1	6.5	8.6	8.6	13.7	13.6	20.6	20.2	32.3	3.0	-0.5 – 1.1	1.1		
60	6.0	8.5	7.9	10.4	10.4	16.4	16.3	24.8	24.4	39.0	3.6	-0.6 – 1.3	1.3		
70	7.0	10.0	9.2	12.1	12.2	19.2	19.1	29.0	28.6	45.7	4.2	-0.7 – 1.5	1.5		
80	8.0	11.5	10.6	13.9	13.9	22.0	21.9	33.2	32.8	52.4	4.8	-0.8 – 1.7	1.7		
90	9.0	12.9	11.9	15.7	15.7	24.8	24.7	37.4	37.0	59.0	5.5	-0.9 – 1.9	1.9		
100	10.0	14.4	13.3	17.4	17.5	27.6	27.5	41.6	41.3	65.7	6.1	-0.9 – 2.1	2.1		
120	12.0	17.3	15.9	21.0	21.0	33.2	33.1	50.1	49.7	79.0	7.3	-1.1 – 2.5	2.5		
150	15.1	21.7	20.0	26.3	26.3	41.6	41.4	62.7	62.3	99.1	9.2	-1.4 – 3.1	3.1		
200	20.1	29.0	26.7	35.1	35.2	55.5	55.4	83.8	83.4	132.4	12.3	-1.8 – 4.1	4.1		
250	25.2	36.3	33.4	43.9	44.0	69.5	69.3	104.8	104.5	165.8	–	-2.3 – 5.2	–		
300	30.3	43.6	40.1	52.8	52.8	83.5	83.3	125.9	125.6	199.2	–	-2.7 – 6.2	–		
400	40.4	58.2	53.5	70.5	70.5	111.4	111.2	168.0	167.8	265.9	–	-3.6 – 8.2	–		
500	50.6	72.8	66.9	88.2	88.2	139.3	139.0	210.1	210.0	332.6	–	-4.5 – 10.3	–		
600	60.7	87.4	80.3	105.8	105.9	167.2	166.9	252.3	252.2	399.4	–	-5.4 – 12.3	–		

- The value for L (distance to screen) varies slightly depending on the zoom lens characteristics.
- At the shortest projection distance, the zoom lens characteristics may cause slight image distortion.
- When vertical keystone correction is used, the image is corrected in the direction that reduces its projected size.
- The brightness varies depending on the zoom setting.

Calculation of the projection distance

For a screen size different from the above, use the equation below to calculate the projection distance.

Aspect ratio 15:9

ET-DLE100	minimum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 30.0 - 45$
	maximum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 40.4 - 48$
ET-DLE150	minimum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 30.4 - 54$
	maximum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 43.8 - 50$
Supplied lens	minimum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 40.2 - 65$
	maximum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 53.0 - 64$
ET-DLE200	minimum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 54.7 - 66$
	maximum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 89.5 - 76$
ET-DLE250	minimum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 53.0 - 80$
	maximum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 83.8 - 79$
ET-DLE310	minimum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 78.6 - 106$
	maximum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 102.6 - 105$
ET-DLE350	minimum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 83.6 - 135$
	maximum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 126.3 - 135$
ET-DLE410	minimum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 104.4 - 137$
	maximum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 195.1 - 135$
ET-DLE450	minimum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 126.6 - 302$
	maximum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 200.1 - 299$
ET-DLE050	(fixed focus)	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 18.0 - 36$
ET-DLE055	(fixed focus)	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 18.6 - 48$

- Distances calculated with the above equations will include a slight error.
- When an SXGA signal is input, the left and right edges of the image are blanked, and the image is projected at a screen aspect ratio of 5:4.
- The brightness varies depending on the zoom setting.

Aspect ratio 16:9

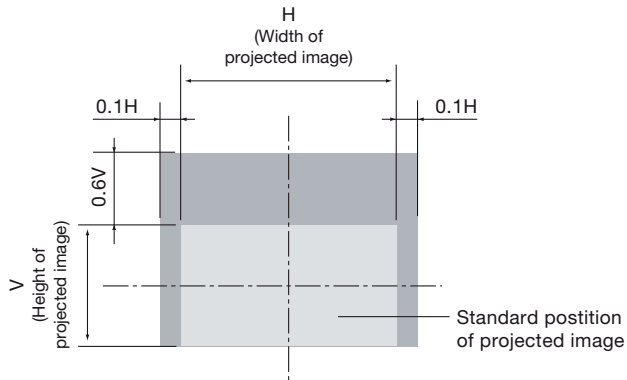
ET-DLE100	minimum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 30.5 - 45$
	maximum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 41.1 - 48$
ET-DLE150	minimum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 30.9 - 54$
	maximum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 44.5 - 50$
Supplied lens	minimum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 40.9 - 65$
	maximum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 53.9 - 64$
ET-DLE200	minimum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 55.6 - 66$
	maximum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 91.0 - 76$
ET-DLE250	minimum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 53.9 - 80$
	maximum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 85.1 - 79$
ET-DLE310	minimum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 79.9 - 106$
	maximum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 104.3 - 106$
ET-DLE350	minimum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 85.0 - 135$
	maximum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 128.4 - 135$
ET-DLE410	minimum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 106.1 - 137$
	maximum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 198.3 - 135$
ET-DLE450	minimum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 128.6 - 302$
	maximum	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 203.4 - 299$
ET-DLE050	(fixed focus)	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 18.3 - 36$
ET-DLE055	(fixed focus)	$L \text{ (mm)} = (\text{diagonal screen size in inches}) \times 19.0 - 48$

- Distances calculated with the above equations will include a slight error.
- When an SXGA signal is input, the left and right edges of the image are blanked, and the image is projected at a screen aspect ratio of 5:4.
- The brightness varies depending on the zoom setting.

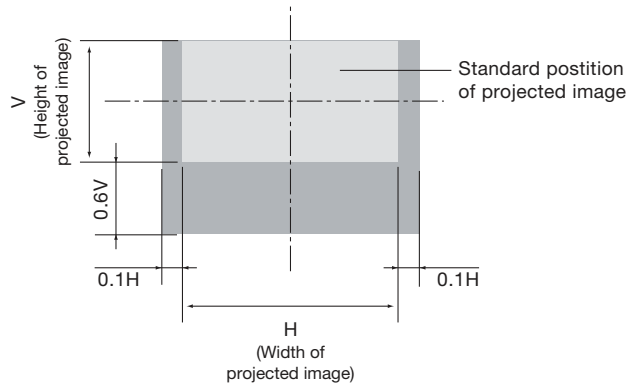
Shift range

Optical axis shift function allows to shift the position of a projected image as shown below.

• Floor mount



• Ceiling mount

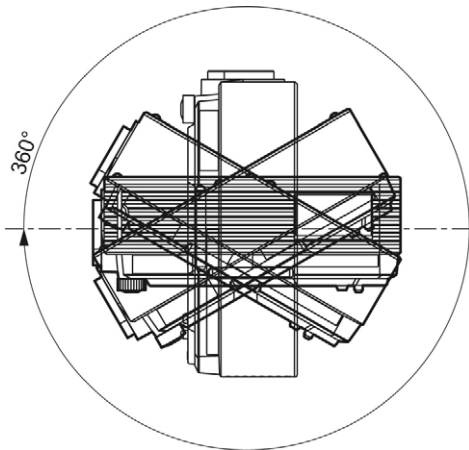


Installable angle

Install the projector at an angle within the range shown below.

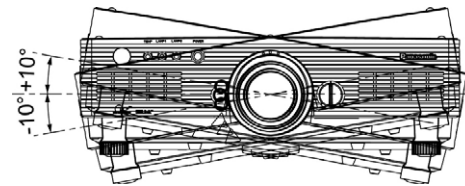
• Vertical direction

The projector may be installed at a vertical angle of 360° .



• Horizontal direction

The projector may be installed at a horizontal angle of $\pm 10^\circ$.



List of compatible signals

This projector supports RGB signals with horizontal frequencies of 15 to 91 kHz, vertical frequencies of 50 to 85 Hz and up to 150 MHz dot clock.

NOTE: The native resolution of this projector is 1,280 x 768 pixels. If the display resolution of the input signal is different from the native resolution, image compression or expansion will be used to convert the input signal to a level within the native resolution.

Display mode	Display resolution (dots) ¹	Scanning frequency H (kHz)	V (kHz)	Dot clock frequency (MHz)	Picture quality ²	Format
NTSC/NTSC4.43/PAL-M/PAL60	720 x 480i	15.7	59.9	-	A	VIDEO/S-VIDEO
PAL/PAL-N/SECAM	720 x 576i	15.6	50.0	-	A	
480i (525i)	720 x 480i	15.7	59.9	13.5	A	YPbPr /RGB
576i (625i)	720 x 576i	15.6	50.0	13.5	A	
480p (525p)	720 x 483	31.5	59.9	27.0	A	YPbPr /RGB/DVI
576p (625p)	720 x 576	31.3	50.0	27.0	A	
720/60p	1,280 x 720	45.0	60.0	74.3	A	
720/50p	1,280 x 720	37.5	50.0	74.3	A	
1080/60i	1,920 x 1,080i	33.8	60.0	74.3	A	
1080/50i	1,920 x 1,080i	28.1	50.0	74.3	A	
1080/60p	1,920 x 1,080	67.5	60.0	148.5	A	
1080/50p	1,920 x 1,080	56.3	50.0	148.5	A	
VGA400	640 x 400	31.5	70.1	25.2	A	RGB
		37.9	85.1	31.5	A	
VGA480	640 x 480	31.5	59.9	25.2	A	RGB/DVI
		35.0	66.7	30.2	A	RGB
		37.9	72.8	31.5	A	
		37.5	75.0	31.5	A	
		43.3	85.0	36.0	A	
SVGA	800 x 600	35.2	56.3	36.0	A	
		37.9	60.3	40.0	A	RGB/DVI
		48.1	72.2	50.0	A	RGB
		46.9	75.0	49.5	A	
		53.7	85.1	56.3	A	
MAC16	832 x 624	49.7	74.6	57.3	A	
XGA	1,024 x 768	39.6	50.0	51.9	AA	RGB/DVI
		48.4	60.0	65.0	AA	
		56.5	70.1	75.0	AA	
		60.0	75.0	78.8	AA	
		68.7	85.0	94.5	AA	
		35.5	87.0	44.9	AA	RGB
WXGA	1,280 x 768	39.6	50.0	65.2	AA	RGB/DVI
		47.7	60.0	80.1	AA	
	1,280 x 800	41.3	50.0	68.0	A	RGB
		49.7	59.8	83.5	A	
MXGA	1,152 x 864	64.0	71.2	94.2	A	
		67.5	74.9	108.0	A	
		76.7	85.0	121.5	A	
MAC21	1,152 x 870	68.7	75.1	100.0	A	
MSXGA	1,280 x 960	60.0	60.0	108.0	A	
SXGA	1,280 x 1,024	64.0	60.0	108.0	A	RGB/DVI
		80.0	75.0	135.0	A	RGB
		91.1	85.0	157.5	A	
SXGA+	1,400 x 1,050	64.0	60.0	108.0	A	RGB/DVI
UXGA	1,600 x 1,200	75.0	60.0	162.0	A	RGB

1. The "i" appearing after the resolution indicates an interlaced signal.

2. The following symbols are used to indicate picture quality.

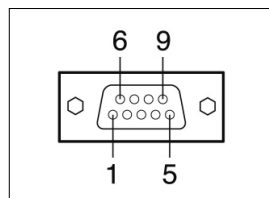
AA Maximum picture quality can be obtained.

A Signals are converted by the image processing circuit before picture is projected.

Serial connector

The serial connector complies with RS-232C. To control the projector from a personal computer, commands must be input through communication software, based on the format and satisfying the communication conditions shown below.

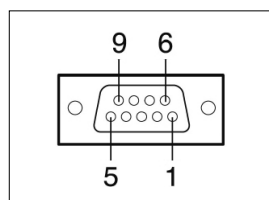
Pin assignments and signal names



D-sub 9-pin (female)
Serial input

No.	Signal name	Description	No.	Signal name	Description
1	–	NC	6	–	NC
2	TXD	Send data	7	CTS	Connected internally
3	RXD	Receive data	8	RTS	Connected internally
4	–	Connected internally	9	–	NC
5	GND	Ground			

Pin assignments and signal names



D-sub 9-pin (male)
Serial output

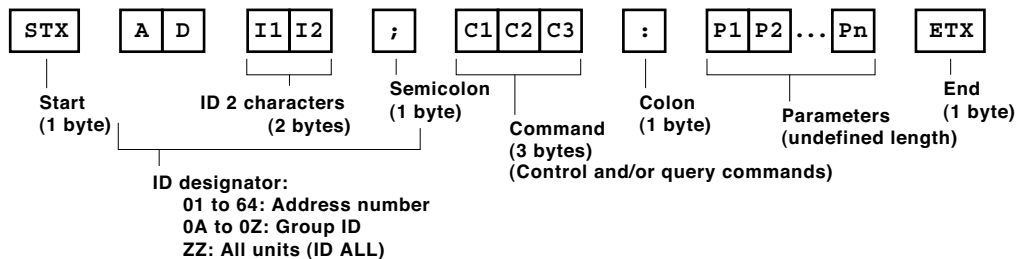
No.	Signal name	Description	No.	Signal name	Description
1	–	NC	6	–	NC
2	RXD	Receive data	7	RTS	Connected internally
3	TXD	Send data	8	CTS	Connected internally
4	–	Connected internally	9	–	NC
5	GND	Ground			

Communication conditions (factory setting)

Signal level	RS-232C-compliant
Synchronization method	Start-stop synchronization
Baud rate	9,600 bps
Parity	None
Character length	8 bits
Stop bit	1 bit
X parameter	None
S parameter	None

Basic format

Transmission from the computer begins with STX, then the ID, command, parameter, and ETX are sent in this order. Add parameters according to the details of control.



CAUTION

- It may not be possible to send or receive commands for about 10 to 60 seconds when the lamp is first turned on. If this occurs, wait for 60 seconds, then try sending or receiving again.
- When sending multiple commands, be sure to wait for at least 0.5 second after receiving a response from the projector before sending the next command.
- Additional time is sometimes required for response due to processing inside the projector. Set the time-out period for command response to 10 seconds or more.

Cable specifications

Projector		PC (DTE)	
1	NC	NC	1
2			2
3			3
4	NC	NC	4
5			5
6	NC	NC	6
7			7
8			8
9	NC	NC	9

Control commands

Item	Command : Parameter	Function	Callback
POWER	PON* ¹	Power on	PON
	POF* ¹	Standby power off	POF
FREEZE	OFZ:0	Freeze off	OFZ:0
	OFZ:1	Freeze on	OFZ:1
AUTO SETUP	OAS	Auto setup	OAS
SHUTTER	OSH:0* ^{1/2}	Shutter off	OSH:0
	OSH:1* ^{1/2}	Shutter on	OSH:1
INPUT SELECT	IIS:RG1	RGB 1	IIS:RG1
	IIS:RG2	RGB 2	IIS:RG2
	IIS:VID	Video	IIS:VID
	IIS:SVD	S-Video	IIS:SVD
	IIS:DVI	DVI	IIS:DVI
TEST	OTS:00	Exit test pattern	OTS:00
	OTS:01	White (full on)	OTS:01
	OTS:02	Black (full off)	OTS:02
	OTS:03	Flag	OTS:03
	OTS:05	Window	OTS:05
	OTS:07	Focus	OTS:07
	OTS08	Color bar	OTS08
ON SCREEN	OOS:0	On-screen display off	OOS:0
	OOS:1	On-screen display on	OOS:1

*1 Do not send PON, POF, OSH, or OLP commands continuously in a short period of time. Doing so may burst the lamp or shorten the lamp replacement cycle.

*2 When a command that cannot be executed during standby mode is sent, the projector will send an ER401 command in reply.

Adjustment mode

Item	Command: Parameter	Description	Callback: Parameter	Parameter value	
				Min.	Max.
PICTURE MODE	VPM:NAT	Natural	VPM:NAT	-	-
	VPM:STD	Standard	VPM:STD	-	-
	VPM:DYN	Dynamic	VPM:DYN	-	-
	VPM:CIN	Cinema	VPM:CIN	-	-
	VPM:GRA	Graphic	VPM:GRA	-	-
SYSTEM	VXX:DLVI0=+00000	Off	VXX:DLVI0=+00000	-	-
DAYLIGHT	VXX:DLVI0=+00001	1	VXX:DLVI0=+00001	-	-
VIEW	VXX:DLVI0=+00002	2	VXX:DLVI0=+00002	-	-
	VXX:DLVI0=+00003	3	VXX:DLVI0=+00003	-	-
COLOR	VCO:p1p2p3	Color	VCO:p1p2p3	1	63
TINT	VTN:p1p2p3	Tint	VTN:p1p2p3	1	63
COLOR TEMP.	OTE:1	Middle	OTE:1	-	-
	OTE:2	High	OTE:2	-	-
	OTE:4	User	OTE:4	-	-
	OTE:10	Default	OTE:10	-	-
CONTRAST	VCN:p1p2p3	Contrast	VCN:p1p2p3	1	63
BRIGHTNESS	VBR:p1p2p3	Brightness	VBR:p1p2p3	1	63
SHARPNESS	VSR:p1p2p3	Sharpness	VSR:p1p2p3	0	15
SET DATE	TSD:y1y2y3y4m1m2d1d2w	Date setting	TSD:y1y2y3y4m1m2d1d2w	200701011	203512317
SET TIME	TST:h1h2m1m2s1s2	Time setting	TST:h1h2m1m2s1s2	000000	235959

Status asking commands

Item	Command:Parameter	Function	Callback	Description
POWER CONDITION	QPW	Main power status	000	Standby (Off)
			001	On
FREEZE	QFZ	Freeze function status	0	Off
			1	On
SHUTTER	QSH	Shutter function status	0	Off
			1	On
INPUT SIGNAL	QIN	Input signal status	RG1	RGB 1
			RG2	RGB 2
			VID	Video
			SVD	S-Video
			DVI	DVI
TEST	QTS	Test pattern status	0	Exit test pattern
			1	White (full on)
			2	Black (full off)
			3	Flag
			5	Window
			7	Focus
			8	Color bar
ON SCREEN	QOS	On-screen display status	0	Off
			1	On
PICTURE MODE	QPM	Picture mode status	NAT	Natural
			STD	Standard
			DYN	dynamic
			CIN	Cinema
			GRA	Graphic
SYSTEM DAYLIGHT VIEW	QVX:DLVIO	System daylight view status	DLVIO=+00000	Off
			DLVIO=+00001	1
			DLVIO=+00002	2
			DLVIO=+00003	3
COLOR	QVC	Color adjustment value	p1p2p3	
TINT	QVT	Tint adjustent value	p1p2p3	
COLOR TEMP.	QTE	Color temperature adjustment status	1	Middle
			2	High
			4	User
			10	Default
CONTRAST	QVR	Contrast adjustment value	p1p2p3	
BRIGHTNESS	QVB	Brightness adjustment value	p1p2p3	
SHARPNESS	QVS	Sharpness adjustment value	p1p2p3	
SET RUNTIME	QST	Picture mode status	p1p2p3p4p5	00000h–99999h
LAMP ON TIME	Q\$L:1	Lamp 1 run time	p1p2p3p4	0000h–9999h
(LAMP TIMER)	Q\$L:2	Lamp 2 run time	p1p2p3p4	0000h–9999h
LAMP SELECT	QSL	Lamp operation mode status	0	Dual
			1	Single
			2	Lamp 1
			3	Lamp 2
LAMP POWER	QLP	Lamp power mode status	0	High
			1	Low
VPS SYSTEM	QVY	VPS system status	0	Slave
			1	Master
TMP CHECK	QTM:0	Temperature status	p1p2p3p4/p5p6p7p8 ^(*)	p0 = Intake air
	QTM:1			p1 = Exhaust air
	QTM:2			p2 = DLP™ chip
GET DATE	QGD	Date setting status	y1y2y3y4m1m2d1d2w	yyyymmdd (day of week) ^(*)
GET TIME	QGT	Time setting status	h1h2m1m2s1s2	hhmmss ^(*)

*1 p1p2p3p4: Celsius (°C), p5p6p7p8: Fahrenheit (°F)

*2 Day of week: Monday = 1, Tuesday = 2, ... Sunday = 7

*3 Set the date and time to UTC (universal time coordinated).

Parameter format

Parameter format	Size (Byte)	Definition
<pl>	3 (1 or 2 bytes also possible when under control)	Dicimal without signs: 0-999 (000, 001, 002...999) Dicimal with signs: -99 to +99 (-99...-01, +00, +01, +02...+99) Callback from the projector is 3 Byte.
<off on>	1	0 = off, 1 = on
<input signal>	3	RG1 = computer 1, RG2 = computer 2, VID = video, SVD = S-Video, DVI = DVI
<installation>	1	0 = front, 1 = rear, 2 = ceiling and front, 3 = ceiling and rear
<language>	3	ENG = English, DEU = German, FRA = French, ESP = Spanish, ITL = Italian, JPN = Japanese, CHI = Chinese, RUS = Russian, KOR = Korean
<power condition>	3	000 = standby power off, 001 = standby power on
<lamp on time>	4	Decimal without signs: 0000-9999 hours
<lamp select>	1	0 = dual, 1 = single, 2 = lamp 1, 3 = lamp 2
<lamp power>	1	0 = high, 1 = low
<acctch>	4	Decimal without signs: 0000-9999 hours
<color temp>	2	1 = mid, 2 = high, 4 = user, 10 = default
<date>	9	y1y2y3y4m1m2d1d2w = year (y) month (m) day (d) day of week (w) Day of week: Monday = 1, Tuesday = 2, ... Sunday = 7
<time>	6	h1h2m1m2s1s2 = hour (h) minute (m) second (s)

NOTE: If a wrong command is received, the projector will send an ER401 command to the computer.

Command example

To set the on-screen display off, send the command as shown below.

STX	ADZZ	;	OOS	:	30	ETX
Start	ID Address		Command		Parameter	End

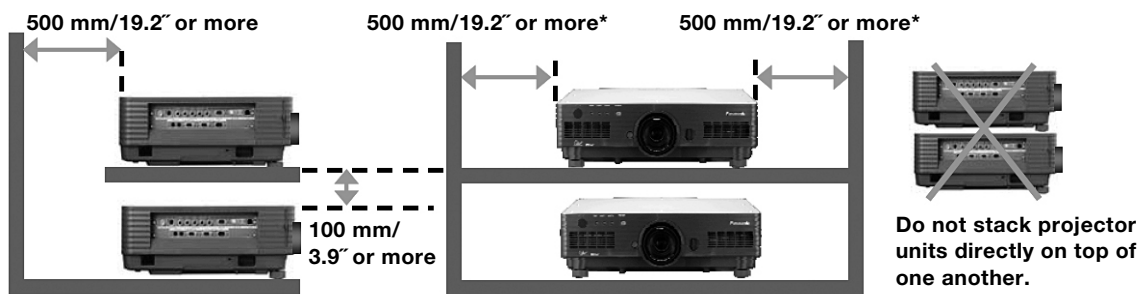
NOTE: When sending commands without parameters, a colon (:) is not necessary.

Notes on Projector Placement and Operation

The projector uses a high-wattage lamp that becomes very hot during operation. Please observe the following precautions.

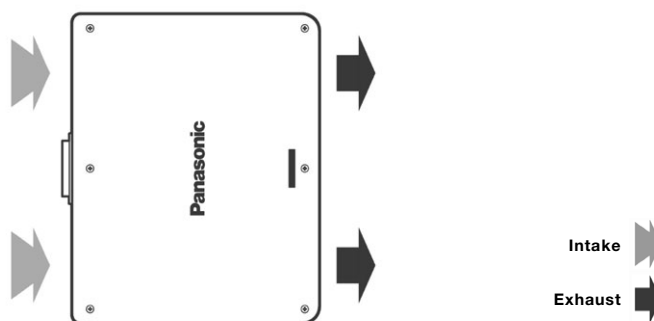
1. Never place objects on top of the projector while it is operating.
2. Make sure there is an unobstructed space of 500 mm or more around the projector's exhaust openings.
3. Do not stack projector units directly on top of one another. If two units must be stacked for back-up use in ordinary projection, use a method as shown below and provide ample space between the units to ensure that exhaust heat does not accumulate near the intake opening or around the units. Dual stacked projection of the PT-DW5100/DW5100L is not recommended.
4. If the projector is placed in a box or enclosure, ensure the temperature of the air surrounding the projector is between 0°C/32°F and 40°C/104°F*. Also make sure the projector's intake and exhaust openings are not blocked. Take particular care to ensure that hot air from the exhaust openings is not sucked into the intake openings.

* Even when the ambient temperature near the intake opening is 40°C/104°F or lower, an accumulation of hot air inside the cabinet may cause the protective circuit to activate and shut down the projector. Please give ample consideration to the design with regard to ambient temperature conditions.



* Minimum distance when two units are used together.
Keep 300 mm/11.8 inches or more when a single unit is used.

Direction of Air Intake and Exhaust



Operating the Projector Continuously

1. If the projector is to be operated continuously 24 hours a day, use the dual-lamp optical system's alternating lamp operation (lamp changer) function. The projector cannot be operated continuously 24 hours a day in dual-lamp mode.
Allow a minimum of two hours per day of non-operation time.
2. The lamp replacement cycle duration becomes shorter if the projector is operated repeatedly for short periods.

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